CLAIMS

1. A scaleable inter-digitized tine non-thermal plasma reactor element comprising:

at least one pair of inter-digitized tine end connectors connected together and defining gas passages between tines;

alternate ground and charge carrying electrodes provided on said tines;

said inter-digitized tine reactor element having a scaleable height, width, and length, selected to provide a plurality of active plasma zones during reactor operation.

2. The scaleable reactor of claim 1, wherein a frontal area of said reactor element has multiple electrodes provided in the exhaust flow direction to enable a variable active plasma zone for various operating conditions.

3. The scaleable reactor of claim 1, wherein said reactor element comprises a double dielectric barrier element having exhaust passages bounded by a dielectric barrier in the plasma direction.

4. The scaleable double dielectric barrier reactor element of claim 3 comprising:

structural carrier dielectric connectors.

5. The scaleable double dielectric barrier reactor element of claim 3 comprising:

structural conductor connectors.

6. The scaleable reactor of claim 1, wherein said reactor element comprises a single dielectric barrier element having exhaust passages bounded by a dielectric barrier on a first side and by an electrode on a second opposite side in the plasma direction.

7. The scaleable single dielectric reactor element of claim 6 comprising:

a structural carrier dielectric connector; and

a null dielectric barrier structural carrier connector.

8. The scaleable single dielectric reactor element of claim 6, wherein said reactor element comprises:

a structural conductor connector; and

a null dielectric barrier structural conductor connector.

9. The scaleable reactor element of claim 1, wherein said reactor element comprises a null dielectric barrier element comprising at least one pair of null dielectric barrier comb connectors, said combs having tines defined in a side to side configuration comprising a first electrode layer, a structural dielectric layer, and a second electrode layer;

said null dielectric barrier element having exhaust passages bounded by electrodes on each side, in the plasma direction.

10. The scaleable null dielectric barrier element of claim 9 comprising:

structural carrier connectors.

11. The scaleable null dielectric barrier element of claim 9, comprising:

structural conductor connectors.

12. A scaleable inter-digitized tine non-thermal plasma reactor comprising the element of claim 1, further comprising:

suitable power and ground electrical connections provided to said electrodes; and

a housing to contain said reactor element.

13. The non-thermal plasma reactor of claim 12, wherein said reactor comprises a double dielectric barrier element, a single dielectric barrier element, or a null dielectric barrier element.

14. The non-thermal plasma reactor of claim 13, wherein said reactor comprises structural carrier dielectric connectors, structural conductor connectors, null dielectric barrier connectors, or a combination thereof.

15. A method for preparing an inter-digitized tine non-thermal plasma reactor element comprising

connecting at least one pair of inter-digitized tine end connectors to provide an inter-digitized tine element defining gas passages between tines;

providing alternate ground and charge carrying electrodes provided on said tines;

providing said inter-digitized tine reactor element with a scaleable height, width, and length, so as to effect a plurality of active plasma zones during reactor operation.

16. The method of claim 15, further comprising:

disposing multiple electrodes in a frontal area of said element in the exhaust flow direction to enable a variable active plasma zone in accordance with variable operating conditions.

17. The method of claim 15, wherein said reactor element comprises a double dielectric barrier element having exhaust passages bounded by a dielectric barrier in the plasma direction.

18. The method of claim 17, wherein said reactor element comprises structural carrier dielectric connectors.

19. The method of claim 17, wherein said reactor element comprises structural conductor connectors.

20. The method of claim 15, wherein said reactor element comprises a single dielectric barrier element having exhaust passages bounded by a dielectric barrier on a first side and by an electrode on a second opposite side in the plasma direction.

21. The method of claim 20, wherein said reactor element comprises structural carrier dielectric connectors.

22. The method of claim 20, wherein said reactor element comprises:

a structural conductor connector; and

a null dielectric barrier structural conductorconnector.

23. The method of claim 15, wherein said reactor element comprises a null dielectric barrier element comprising at least one pair of null dielectric barrier comb connectors, said combs having tines defined in a side to side configuration comprising a first electrode layer, a structural dielectric layer, and a second electrode layer;

said null dielectric barrier element having exhaust passages bounded by electrodes on each side, in the plasma direction.

24. The method of claim 23, wherein said reactor element comprises structural carrier connectors.

25. The method of claim 23, wherein said reactor element comprises structural conductor connectors.